Review of Economic Analysis 2 (2010) 232-255 1973-3909/2010232

An Agent-Based Decision Support Model for the Development of E-Services in the Tourist Sector

FRANK BRUINSMA
VU University Amsterdam

KARIMA KOURTIT
VU University Amsterdam

PETER NIJKAMP
VU University Amsterdam *

This paper regards cultural heritage as a strategic development tool for urban tourist policy. It highlights the use of e-services as a central instrument in a competitive tourist sector. The appropriate choice of e-services – and packages thereof – depends on the various strategic considerations of urban stakeholders (agents) and may differ for each individual city. The paper offers a systematic analysis framework for supporting these choices and deploys multi-criteria analysis as a systematic evaluation methodology, in particular the Regime method. The evaluation framework is exemplified through an application to three field cases in Europe, viz. the cities of Amsterdam, Genoa and Leipzig. Our analysis concludes that tailor-made packages of e-services that serve the needs of the stakeholders can be made with the help of our evaluation tools.

Keywords: cultural heritage, e-services, city marketing, agent-based decision support model

JEL Classifications: H4, Z1

1 Tourism as an Advanced Growth Sector

Our modern society shows the signs of a highly mobile network economy. With the advent of rising mobility and leisure time together with a structural tendency for declining airfares, tourism has become a sector of major significance in modern economies. There is a wealth of

* This paper is a result of an EU FP7 project called ISAAC (Integrated e-Services for Advanced Access to Heritage in Cultural Tourist Destinations). Various ISAAC-participants are thanked for their support, in particular our city partner representatives Egbert Wolf (Amsterdam), Paulo Dallorso (Genoa) and Tilo Koppig (Leipzig).

© 2010 Frank Bruinsma, Karima Kourtit and Peter Nijkamp. Licensed under the Creative Commons Attribution – Non-commercial 3.0 Licence (http://creativecommons.org/licenses/by-nc/3.0/. Available at http://rofea.org.

literature on the motives of tourists, on the sustainability aspects of large-scale tourism, on the expected economic and social consequences of tourism in host countries and regions, on the attractiveness of different localities and tourist sites (e.g., beaches, historic-cultural heritage, nature etc.), or on local or regional initiatives to promote tourism (e.g., through tourism packages, e-services etc.). Tourism research has indeed become a booming and timely research approach in contemporaneous economics. And its importance will most likely grow in the decades to come (see also Cooper 2008).

It seems highly plausible that tourism will become one of the fastest growing economic sectors in our century. This holds for both domestic and international tourism. For example, since World War II the volume of international tourism has increased with a factor 30 (see UN WTO 2006). And domestic tourism has even increased more. Tourism is also a source of economic growth resulting from expenditures on travel, accommodation; entertainment, etc. (see Matias et al. 2008).

A variety of background factors may explain this unprecedented growth in tourism: improvement in transport systems and infrastructure, new information technology and logistics, increase in wealth and disposable income in large parts of our world, new lifestyles and more leisure time, and international openness and globalization in Europe and worldwide (see Prosser 1994, Giaoutzi and Nijkamp 2006, Urry 2002). Clearly, the rapid growth in long-haul tourism has also its shadow sides in the form of environmental externalities and threats to sustainable development (see e.g. Cooper and Lockwood 1994, Lindberg et al. 2001, and Sharpley 2000).

Tourism is often regarded as a luxury good with high price elasticity, so that it is sensitive to price differences and economic fluctuations. Consequently, we observe an increasing competition among tourist destinations. Supply and demand conditions form a complex force field and call for solid applied research. Amelung (2006) presents a consistent analytical and explanatory framework for tourism and distinguishes six background factors: demography (e.g. population growth and migrant flows), culture (e.g. leisure, fashion, hedonism), economy (e.g. discretionary income), technology (e.g. ICT, high-speed transport systems), environment (e.g. nature and climate), and institutions and politics (e.g. liberalization, global tourist operators).

The economic impacts of tourism – both inbound and outbound – are formidable and ought to be traced systematically. They range from macro-economic effects (such as the balance of payment, taxes or employment) to micro-economic effects (such as the economic position of local shopkeepers or diversification of the local economy). In addition, the economic impacts have to be confronted with environmental impacts (such as emission of pollutants, sewage, biodiversity or landscape destruction) and socio-cultural impacts (such as local identity etc).

Through the use of ICT tools, such as e-services, tourists can be provided with various

information on natural and cultural attractions (volcanoes, beaches, rain forests) and specific activities (golf courses, wild water rafting, surfing, diving, etc) in order to raise their awareness of the importance and richness of environmental and economic values of resources (e.g. cultural heritage or the natural environment) and destinations. This awareness, mediated by the notion of self-efficacy, contributes to the creation of eco-friendly attitudes of visitors.

Thus, the support of e-services can provide (specialized) information on the quality of life and sustainability in cities: information on the safety (crime rate, vandalism, preventive measures taken), quiet (noise, annoyance to residents, visual intrusion), pollution (air pollution, water pollution, littering), and urban green (supply of green spaces, accessibility of urban green, urban areas designated as cultural/natural heritage) of (new) tourist destinations.

When visitors have access to information about places they wish to visit, their perception changes and their appreciation for the landscape and natural features may change as well. Visitors with information do value the natural features more than the visitors without information. In this way, information contributes to sustainable urban development.

In addition, the temporal and spatial impacts of tourism as a largely seasonal activity concentrated in a limited number of places might be recognized. Consequently, there is a need for a solid and multi-faceted analysis of the drivers and impacts of tourism at various scales (from micro to macro). Fortunately, we have witnessed a significant progress in tourism research in the past decades, ranging from modelling economic growth arising from tourism to the design of tourist satellite accounts. The research field of the economics of tourism is still in full motion and rapidly developing.

The research agenda of tourism is not only dynamic, but also vast (see e.g. Crouch 1994, Eilat and Einev 2004, Eugenio-Martin 2003, Giaoutzi and Nijkamp 2006, or Smeral and Weber 2000). It covers many items, ranging from macro- (or meso-) economic research on the importance of the tourist sector or ecological sustainability threats to local or global quality of life to micro-behavioural research on motives or spending patterns of tourists (see also Alegre and Pou 2004, Eymann and Ronning 1997, Giaoutzi and Nijkamp 2006, Smith and Krannich 1998, Swarbrooke 2002). There is thus a need for statistical information on the volumes, the transport patterns and modal choices, the destination choices and expenditures of tourists, as well as on the supply of accommodations, the tourist infrastructure and the nature of tourist products (ranging from nature or beaches to cultural heritage or festivals). There is also a need for strategic insights into structural changes in the tourist sector, such as the rise of low cost carriers, changes in the tour operators' branch, the impacts of changing life styles (e.g. multiple short holidays), or the threats for sustainable tourism development emerging from mass tourism to ecologically vulnerable areas or destinations with a valuable cultural heritage. Our study will address in particular planning issues related to cultural heritage in cities, against the background of the opportunities offered by the modern ICT sector.

Tourism – as part of a modern urban economy – is instigated by mass mobility related to our leisure economy in a global society. Clearly, a significant part of mass tourism is related to entertainment based on nature, beach and sun or social activities, but cultural tourism is a new element that is on a rising edge. Many cities and regions host a wealth of cultural attractions and have to compete for the favours of visitors, both domestic and international. In the meantime, mass tourism is gradually dissipating into dedicated market segments with specialized and customized characteristics. Thus, urban tourist policy is becoming a segmental and tailor-made activity, in which ICT may play a critical role. The rapid advances in the ICT world have induced the emergence of a rich variety of e-services for tourism. And these services will be analyzed in particular in the present paper.

This paper is organized as follows. Section 2 will be devoted to a concise description of recent trends in cultural tourism in relation to e-services provided by host cities. Then, in Section 3 we will outline the strategic public choices and evaluation criteria that result from a broad survey of the literature. Section 4 will next outline the research methodology, in particular the choice of strategic assessment and evaluation criteria by stakeholders in the cities, while Section 5 will describe the scenario design for each of the partner cities and the multi-criteria evaluation framework to evaluate these scenarios. The actual evaluation of the city-specific scenarios for the three participating cities, viz. Amsterdam, Genoa and Leipzig, will next be offered in Section 6, while also an interpretation of findings will be given. The final section offers some concluding remarks.

2 Cultural Tourism and e-Services

Emancipation of tourism has been an important mega-trend in the past decades. Tourism is part of a modern life style, in which geographical mobility and cultural enjoyment are critical parameters. At the same time, tourism is also a lead sector for accelerated economic growth in many countries and regions. Consequently, tourism policy has become an important vehicle of sustainable economic policy in both the developed and the developing world. In many regions and cities we observe an increasing interest in the potential of tourism and culture as major attraction forces and strategies for economic growth. This trend is part of a broader development from a manufacturing-oriented to an advanced service-led society, in which also the information and communication technology (ICT) plays a key role. Marketing of tourism facilities and cultural amenities is therefore, of great importance in a competitive global economy and thus one of the critical success factors.

A major challenge is of course to ensure a permanent and stable flow of tourists, not only during the high tourist season, but year around. From this perspective, cultural tourism has many advantages, as culture can in principle be supplied the whole year around. This calls for a professional tourist infrastructure, not only for existing well-known tourist attractions, but also for emerging tourist areas which have a wealth of cultural facilities.

The provision of appropriate tourist facilities (e.g., clean beaches, places of historical interest, attractive museums, cultural heritage etc.) is, of course, a major challenge to policy-making bodies, especially in the context of sustainable local development. It is noteworthy that tourists form a rather heterogeneous class. Some want to enjoy a given city or a cultural atmosphere; others are oriented towards specific goods or cultural amenities, such as a lake, a mountain, a museum or a historical district. Many tourist destinations offer a broad package of facilities to be visited, so that they can attract a maximum number of potential visitors from different places of origin. Other tourist places have only one unique sales label, such as Agra with its Taj Mahal or Pisa with its leaning tower. Tourism offers indeed a challenging research domain. Consequently, tourism research is certainly currently on a rising edge, from the perspective of both regional and sectoral research and cultural-geographical research.

Our paper focuses attention in particular on tourism that is (mainly) related to or attracted by the presence of cultural heritage in a tourist destination. Cultural heritage refers to historic-cultural capital that is seen as an important and visibly recognized landmark from the past and that is one of the identity factors of a tourist place. Historic-cultural capital has a few distinct characteristics which distinguish this form of capital from other types of capital, in particular, the exclusive linkage to the 'sense of place', the absence of a proper price formation system, the high degree of lumpiness of the capital good provided, and the occurrence of (spatial-) economic externalities in the supply of this capital good. Managing historic-cultural capital has also a clear interface with local planning, urban architecture, environmental management and transportation policy. Thus, the modern tourist sector – in relation to cultural heritage planning – offers a very interesting but complex scene where socio-cultural forces (e.g., changing tastes and life styles) and geographical factors (e.g., spatial images and perceptions, including marketing strategies) are all important components of tourism policy (see also Coccossis and Nijkamp 1995). Culture has become a crucial resource in the post-industrial economy, as reflected in the use of cultural heritage in the development strategies of the European Union and other bodies.

Cultural heritage – a broad container concept – has a hate-love relationship with modern tourism. It acts as an attraction force for people from different places of origin, while it stimulates local socio-economic development and reinforces a sense of local identity and pride. On the other hand, vast volumes of tourist flows may be at odds with ecologically-benign developments of localities and may negatively affect social cohesion at a local level.

It is often – and sometimes uncritically – taken for granted that cultural tourism (i.e., focussed on a visit to cultural heritage in a given tourist site) is environmentally-benign and hence offers a positive contribution to sustainable development of cities and regions, this sometimes in contrast to beach tourism or sports tourism. Whether or not cultural tourism offers indeed a positive or negative contribution to local sustainable development remains to be seen and cannot be answered affirmatively beforehand. Thus, the valuation of tourist visits

in relation to the historic-cultural heritage in cities calls for a solid reflection on and methodology for cultural tourism assessment at a local level from the viewpoint of both economic significance and sustainable development (see in particular Fusco Girard and Nijkamp 2009).

In the present paper, local cultural value – an expression of creative activities of the human mind at a certain place – is seen to be characterized by a multidimensional composite indicator (for example, economic, symbolic, artistic dimensions of historic-cultural facilities at a certain locality). Cultural values may be enriched by enhancing the quality or attractiveness of a place for visitors. This capacity to attract people and new activities does not only depend on the attributes of cultural heritage itself, but also on other complementary resources, services, or material and immaterial elements. Clearly, all relevant positive and negative economic, environmental, social and cultural impacts in the short, medium and long term are to be properly managed in order to identify and implement win-win projects or plans.

As there is also competition among cities for attracting cultural tourists, specific marketing and supporting vehicles and tools are to be used. One of them is the use of ICT devices that offer so-called e-services. Several cities in Europe have enhanced their ICT capabilities. Research on e-governance and (public and private) e-services is booming at present. The European Commission (2005) has argued that Europe needs efficient, effective, inclusive and open governments in order to offer high quality services for citizens and business. It is foreseen that the introduction of e-governance will generate significant or even massive benefits. For example: the economic impact of moving towards electronic public procurement is generally assessed to be considerable, in terms of increasing efficiencies and reducing procurement costs, so that – given the size of public procurement (some 16% of GDP on average in EU countries) and even assuming that only half of the saving would be realized – this saving would represent over 40 billion per annum in the EU. Many public actors in the tourism sector have recognized the great socio-economic potential of the supply and use of e-services, but the great variety in e-services renders it difficult to design a consistent strategy.

Thus there is a need for a systematic analysis of the pros and cons of investments in e-services in the urban tourist sector in Europe. This means that various cities in Europe will be selected which have an interest in e-services, with a view to start a cooperative endeavour to identify the pros and cons of tourist e-services from a long term strategic policy perspective, based on a systematic analysis.

Our paper develops a framework for a systematic analysis of different packages of tourist e-services in the context of urban cultural heritage. This framework is based on different ambitions for and designs of appropriate e-services for cultural tourism, which are next integrated in a set of distinct policy scenarios which map out the span for planning different packages (or clusters) of relevant e-services. These scenarios are next evaluated in an integrated decision support context through the use of multi-criteria analysis, in particular the

Regime method.

The empirical importance of this approach is illustrated by means of three case studies in Europe from the following cities: Amsterdam, Genoa and Leipzig. These cities are ISAAC city partners involved in the research project and activities. They provided focus groups for the research to cooperate and share their inside knowledge through interviews with cities representatives and cultural attractions' stakeholders, museum observations within the cities and evaluation of a selected sample of their present available e-services and websites.

The focus groups give a clear overview of their present situation in relation to the need for (novel) e-services in the cultural (heritage) tourism sector to better enjoy and promote the cultural attractions in the selected city as perceived by the 3 targeted categories of tourists, residents and service providers. These three cities want to enhance their international tourist profile, not only by improving their image as a cultural tourist attraction, but also by popularizing the cultural heritage of the city and providing more accessible information through the use of e-services regarding cultural heritage. Clearly, any such strategic policy presupposes the involvement of all relevant stakeholders (e.g., residents, the business sector). Our investigation will show that a systematic definition and mapping of the rich variety of perceptional and attitudinal elements that characterize the (current and future) profile of a city for visitors through the provision and use of e-services is feasible and desirable.

3 Assessment of Public Initiatives in Cultural Heritage Related e-Services.

The ICT sector has prompted the development of a wide range of innovative e-services. In recent years, sales via the Internet - online sales - have increased steadily. This is due to the successful implementation of various online ordering systems. Good examples are the online shops of various booksellers, computer manufacturers and various brands of clothing, etc. But also tourism-related booking platforms contributed significantly to this increase. Amongst these are websites offering transportation services, accommodation and packages containing various tourism services respectively (e.g. Expedia Inc., Travelocity, Airlines, etc.). For example, already more than one-half of all airline reservations are made through the Internet (Massey et al. 2007).

The market share of e-services in overall travel sales was 7.4% in 2006 for the European market. The United Kingdom and Germany have the largest online markets, constituting 38% and 22% of the European online travel market. Travel sales online in the European market reached 7.6 billion Euro in 2002 and 17.6 billion Euro in 2006. These figures indicate that e-services have become an important distribution channel in the tourism industry.

An important reason for consumers to use online services is the convenience offered. By using e-services consumers can easily compare characteristics and prices of various products without the need to travel and thus the supply of e-services reduces their search costs (Bakos 1998, Wirtz 2001). Furthermore, as trust in the security of e-services has increased,

consumers are more willing to use them.

Firms using e-services also experience significant cost reductions. This especially applies to marketing, transaction and administration costs (UNCTAD 2005). E-services, for example, give commercial organizations the opportunity to obtain detailed information about their customers at lower costs (Raventos 2006). Furthermore, the provision of high-quality e-services increases consumer loyalty (Chen and Hitt 2002, Rabinovich and Bailey 2004).

Decreasing costs for both buyers and suppliers result in the geographic expansion of tourist markets. Furthermore, the costs of market entry are also reduced when these new forms of distribution and marketing are used. The upsurge of e-commerce thus reinforces the competitive advantage of speed and flexibility and brings more firms into competition both domestically and internationally.

e-Services implemented by the tourism industry, e.g. e-tourism, have produced world-wide significant cost reductions. For example, the direct interaction with customers, through online reservation systems, meant a reduction in commissions paid to travel agencies by hotels and airlines, etc. Since online services are continuously accessible, time and geographic differences do not hinder the interaction between tourism service providers and their customers anymore. As online information can easily be translated, language barriers are also removed. By using ICT, even small tourism organizations can thus enlarge their markets or operate in niche markets by serving a specific group of customers. Small family hotels (e.g., bed-and-breakfast places) for example, are potentially now able to serve guests from around the world at low costs.

The increased use of ICT has clearly resulted in a significant change in the structure of the tourism industry. In the United States, for example, 56 percent of the users of the Internet plan their holidays online (hotel and airline reservations), whereas 23 percent consult both travel agencies and the Internet, and 10 percent exclusively uses travel agencies (UNCTAD 2005).

Not only do e-services form a new channel to sell tourism services, they also changed the way in which tourism organizations communicate with their customers. This led to the development of new products and services. For example, by means of e-services (e.g., photos, video, audio, texts, testimonials, etc.) tourist destinations and cultural attractions can differentiate themselves by making their intangible characteristics or selling-points tangible. Furthermore, tourism organizations can now provide their customers with comprehensive, timely and relevant information either before, during or after their travels. By using e-services these organizations can now customize the services offered to meet the requirements of customers. Assistance can be given to customers throughout the journey and service providers can react immediately to changes in wishes by changing the services offered.

To conclude, by using ICT tourism organizations are able to integrate various activities in the supply chain and offer personalized and enriched tourism experiences (UNCTAD 2005).

The tourism industry has become also a key factor in the marketing of destinations in

developing countries and thus has an important role in economic development (UNCTAD 2005). The presence of multiplier effects results that these increased tourism revenues are spread into multiple sectors. e-Services form very efficient and cost-effective instruments to promote new destinations.

Although the use of e-services had many advantages it is worth to make some remarks. Automated e-services, for example, provide little room for socially rich human interactions and when the distance is too large and trust absent, this may deter customers from purchasing services.

The innovations and changes in the structure of the tourism industry may also result in local and regional tourism suppliers being replaced by global players and thus in a loss of employment. This may be unfavourable in case jobs are scarce in a destination region. The rise of e-services in the tourism industry has already diminished the role of traditional travel agents.

An important requirement for businesses to benefit from the usage of online services is that customers have access to the Internet and the appropriate skills to use it. However, the vast majority of the world population does not have access to the Internet (Buhalis and Deimezi, 2004). Even between the various member states of the European Union discrepancies exist in the maturity and application of e-commerce. Thus, there is an equity involved in the use of e-services.

We may thus conclude that human contact will remain an important factor in the tourism industry, particularly when the planning of a journey is complex. Travel agents will in the future therefore still form a major distribution and information channel, especially since they are able to offer tourist packages.

Not only does ICT allow firms to market their services, but cultural heritage attractions may also benefit from the new options given. These options are related to the increased access to and the preservation of cultural heritage. Both form major contributors to the enhanced knowledge and appreciation of customs, artefacts, folklore, etc.

By using various e-services the ‘consumption’ of cultural heritage is not limited to visiting the respective site but also expanded into the pre- and post-visit stages. This may also influence visitors positively in terms of enjoyment and enrichment. This may increase their appreciation of the cultural heritage and thus the support of its preservation.

The use of ICT may also enhance the experience during the visit. Delivering dynamic and targeted information, for example, contributes to the education and satisfaction of the visitor. Offering location-based services results in people spending more time at the point of interest (e.g. museum) or enjoying a broader set of attractions in a sight-seeing tour.

To ensure the preservation of cultural heritage for future generations the implementation of appropriate systems and technologies is crucial. e-Services have provided excellent opportunities to store and retrieve information in various manners and thus may significantly

contribute to the preservation of cultural heritage. ICT, in particular, is useful for mapping cultural heritage and the creation of inventories of various heritage assets. Furthermore, relevant documentation and descriptions, which were often only accessible to experts, has now become part of the public domain. e-Heritage does not only increase awareness, but the systematic archiving of information also assists decision-makers in conducting appropriately their tasks. In this manner the use of e-services in decision-support situations may result in the improvement of the quality of the decisions being made. The supply and use of e-services has changed the behaviour of supply and demand, and has led to new strategic choices of stakeholders (agents). That's why an agent-based analysis is appropriate.

Table 1 summarizes the findings of an extensive literature review on advantages and disadvantages of respectively e-services, e-tourism, and e-heritage. The entries of this table form a first indication of impacts which may result from the implementation of e-services in tourist cities. Turning these impacts into measurable indicators will allow us to use these in the actual judgment of the e-services developed by means of multi-criteria analysis. The construction of a set of proper assessment indicators will be presented in Section 4 for the cities of Genoa, Leipzig and Amsterdam, which have been selected for an in-depth investigation.

Table 1. Foreseeable Consequences of e-services, e-tourism and e-heritage.

Positive impacts of e-services	**Negative impacts of e-services**
Increase in employment	Decrease in social rich interactions between buyers and suppliers
Increase in the supply of customized tourism services	Increased competition in vulnerable local markets
Increased economic growth	Increased number of bankruptcies of local firms due to the market entry of larger (international) firms
Cost reductions and time-savings for consumers	Destruction of local cultures/customs
Increased revenues for service providers	Decrease in local employment
Cost reductions for service providers	Increased stress on destinations (overcrowding, nuisance, resource depletions, etc.)
Rise in useful competition in the tourism industry	Exclusion of persons not having access to the Internet or the skills to use ICT
Reduction of market entry barriers	Intensification of price competition leading to low levels of customer loyalty
Increased transparency due to the comparability of products and prices	

Positive impacts of e-services	**Negative impacts of e-services**
Price reductions for consumers	
Rise in product innovations	
Integration of distribution channels to offer packages of tourism services	
Enhancement of customer loyalty	
4Possibility of services provided to better match capacity with demand	
Increased access and awareness of other cultures by reducing social distances	
Enhanced access to cultural heritage	
Positive influence on people's awareness, perception and appreciation of cultural heritage	

Source: based on literature review (see Bruinsma et al., 2009)

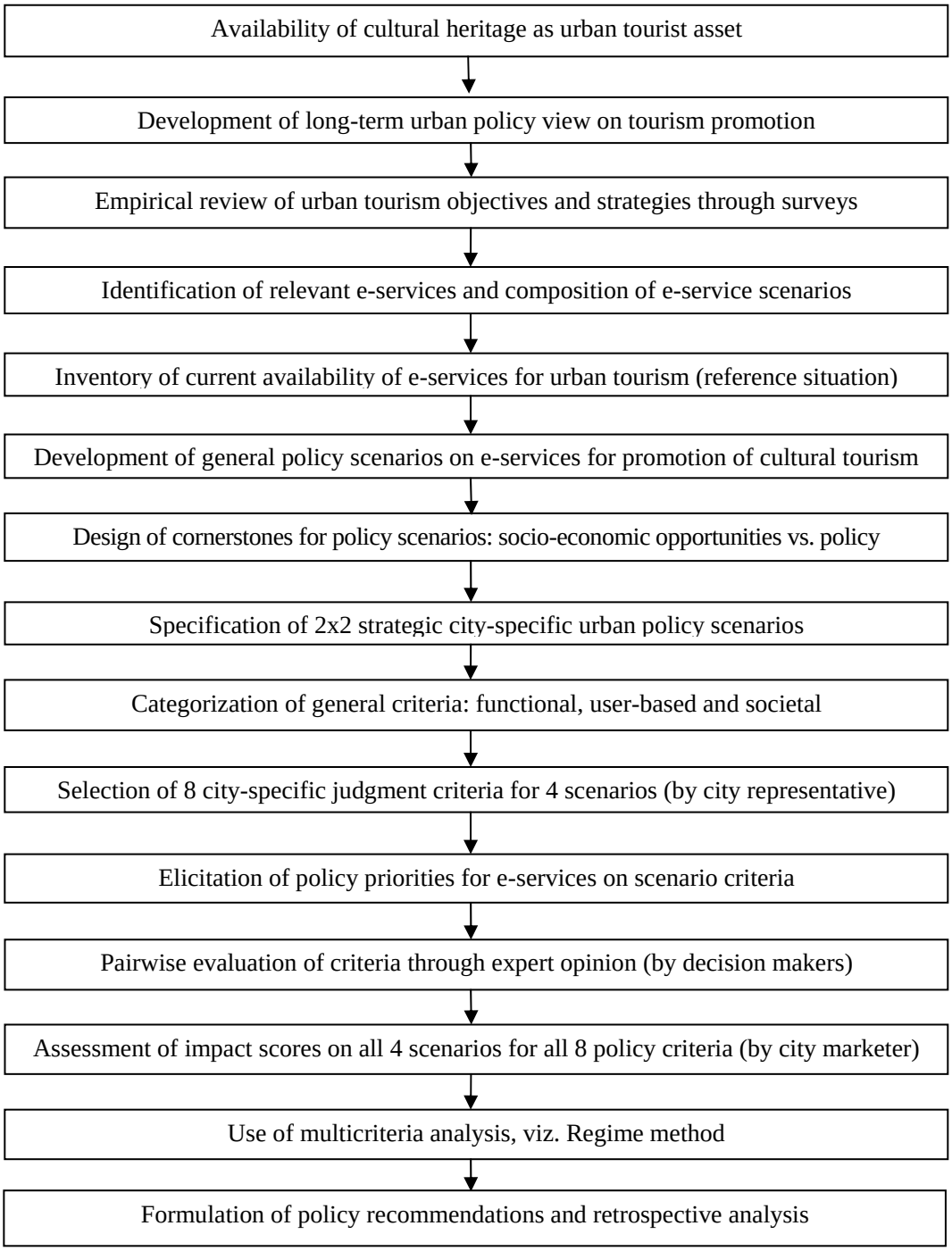
4 Research Methodology

In this section we will concisely describe the methodological approach adopted in this paper. The general aim of this paper is to offer a systematic evaluation of the advantages, failure factors and barriers related to the introduction of integrated e-services in tourist places, with a particular view to the enhancement of advanced access to cultural heritage in cities. Several cities in Europe have developed new types of e-services or are in the process of initiating a search for such services. The paces with which these services are developed show, however, quite some difference, and there is a great deal of uncertainty on the potential benefits of these services for various groups of stakeholders. Thus, there is a need for a systematic analysis of the pros and cons of investments in e-services in the urban tourist sector in Europe.

A promising way to investigate the acceptance, the foreseen advantages, and the likely hurdles in developing e-services for the tourist sector is a learning-by-doing approach. This means that a set of selected cities may be investigated which have an interest in e-services, with a view to start a cooperative endeavour to identify the pros and cons of tourist e-services from a long-term strategic policy perspective, based on a systematic analysis of the strategic considerations of stakeholders.

We will now first systematically outline the various steps in our evaluation of packages of e-services in the cultural tourism sector in the case study cities (see Figure 1). This can be seen as a toolkit for strategy development for other cities, aiming at enhancing their tourism profile.

Figure 1. Stepwise Presentation of Evaluation Analysis for e-services in Urban Cultural Tourism.

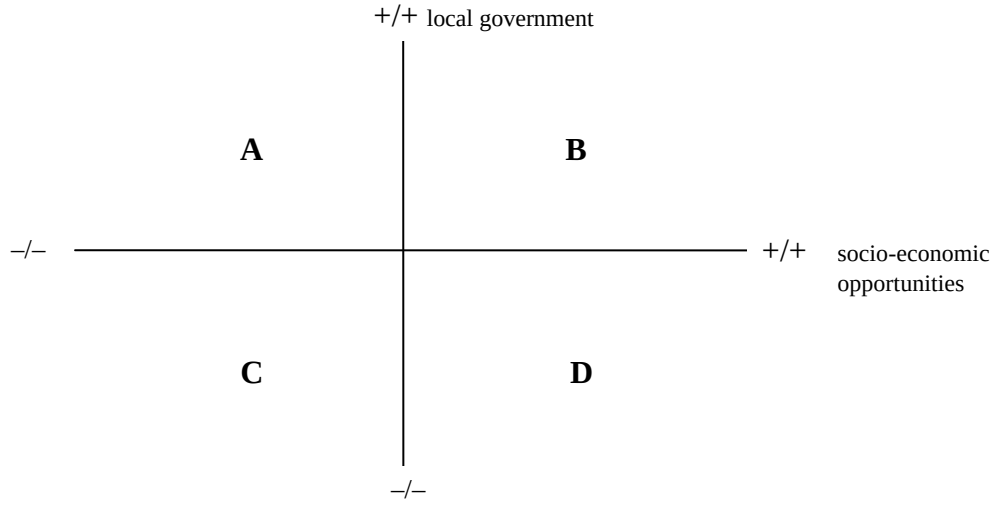


5 Design of General Policy Scenarios for Cultural Tourism

In this section we will pay attention to the design of policy scenarios, which serve as a background for judging the packages of e-services in the three case cities involved. On the basis of a survey questionnaire – addressing issues like the city's strategy in positioning itself in the (inter)national tourist market, the cultural tourism objectives and its consequences for the supply of e-services, the types of stakeholders to be considered and the necessary e-services to the implemented to meet the organizational objectives – the city's goal profile in the cultural tourism market was assessed. This assessment forms the reference situation for developing urban scenarios, based on two dimensions: (i) the degree of active local involvement (or intervention) regarding the design and implementation of e-services and (ii) the range of socio-economic opportunities (minimal to maximal) to design and implement such e-services.

A scenario planning-diagram can now be created from the two above-mentioned dimensions, and hence four policy scenarios can be derived (see Figure 2).

Figure 2. The Scenario Planning Diagram.



Legend:

+/+	: maximal socio-economic opportunities	-/-	: minimal socio-economic opportunities
+/+	: active local government	-/-	: inactive local government

Taking these extreme dimensions, four scenarios can then be distinguished:

- Scenario A: Rowing upstream: active local government, minimal socio-economic opportunities
- Scenario B: The winner takes it all: active local government, maximal socio-economic opportunities

- Scenario C: Take it as it comes: inactive local government, minimal socio-economic opportunities
- Scenario D: Don't worry, be happy: inactive local government, maximal socio-economic opportunities

Next, each city was presented with a long list of 24 possible and relevant judgement criteria (see Table 2) on e-services for cultural tourism, from which the city representative could choose eight specific criteria that were regarded as particularly relevant or important by the city at hand. The main basis for these judgment criteria was formed by functional requirements (criteria 1-10 of Table 2), needs of tourists (criteria 11-19) and societal impacts (criteria 20-24). The selected 8 city-specific criteria were next pair wise evaluated by decision makers responsible for the implementation of e-services in their city to identify a set of city-specific weights for the criteria.

Table 2. The Long List of Criteria for Judging Packages of e-services.

Criterion	**Description of the criteria and how to measure them**
1. Personalization	Does the e-service offer personalized information on users' preferences, desires and needs?
2. Multilanguage	Is the information provided in multiple languages?
3. Up-to-date information	Is the information provided frequently updated?
4. Quality of information	Is the information provided reliable?
5. Podcasts/ downloads	Is the information provided available in downloadable/printed form?
6. Access to booking facilities	Does the e-service give access to online booking systems of cultural heritage attractions and events?
7. Virtual maps	Do the e-services include an interactive map to provide guided tours of the city to get an idea about it without leaving the living room?
8. Profiling	Does the e-service store the user's profile and offer tailored information?
9. e-Participation	Does the service application establish, simplify and improve the interaction (dialogue), and does it enable users to share information, receive updates and hints from other users as well as is it able to engage in cultural and public life of the municipality?
10. e-Governance	Does the application establish, simplify and improve the interaction (dialogue) between citizens and local authorities and between tourists (exchanging hints, opinions, and highlights), and share practical information about the city?
11. Function	Has the e-service all the functions the user needs, provides it all basic information, is it interactive?
12. Design	Is the design attractive, is the way the information is organized clear, is the interface pleasant to use?
13. Ease of use	Is the e-service easy to use, is the information easy to find, is it easy and quick to recover from mistakes and error messages?

Criterion	Description of the criteria and how to measure them
14. Enjoyment	Is using the e-service enjoyable, contains it fun elements?
15. Learning	Is the content offered by the e-service informative, are the messages clear and easy to remember, does it provide it underlying stories and hidden messages?
16. Content	Provides the e-service the information the user needs, is the e-service useful and in the requested language?
17. Future use	Is the e-service comfortable to use, would the user use the e-service again and recommend it to others?
18. Participation	Does the e-service encourage participation (also with residents and other tourists) and is it rich in terms of stakeholder participation?
19. Accessibility	Is the e-service accessible on multiple platforms/devices, is it accessible to visually disabled persons and can the content produced by the e-service also be used when offline (downloads, prints)?
20. Urban socio-economic climate	Has the e-service impact on the performance of economic sectors such as tourism, hospitality, shopping and secondary sectors such as financial services telecommunication, medical care, police and transportation? The impact can be measured by changes (growth) in revenues and customer retention, change (growth) in employment, change (growth) in private investments, new ventures, and changes in the structure of the sector.
21. Quality of life and sustainability	Has the e-service impact on the safety (crime rate, vandalism, preventive measures taken), quietness (noise, destruction of local customs/residents, visual intrusion), pollution (air pollution, water pollution, littering), and urban green (supply of green spaces, accessibility of urban green, the area of urban green assigned as cultural/natural heritage)?
22. Cultural profile	Has the e-service impact on cultural facilities, exhibitions, events, manifestations, and conventions? The impact can be measured by the change in visitors, a change in the capacity to host such activities and a change in the number of activities. Furthermore, impact scan be measured regarding the attitude of visitors towards cultural heritage, for instance, an increasing social awareness of the access to cultural heritage values, a reduction in social distance between cultures, a strengthening of social cohesion, and a change in visitors behaviour (also in time and place) towards cultural heritage
23. Urban land use	Has the e-service an impact on the building sector (measured by change/growth in revenues, employment investments, new ventures) infrastructure facilities (availability of roads, rail, bicycle roads, pavements, pedestrian areas), the perception of the city scape, and urban water systems (number of waterfronts/canals assigned as cultural/natural heritage)?
24. Transportation	Has the e-service an impact on network congestion (traffic congestion, queuing of tourists to enter cultural heritage attractions, accessibility to cultural heritage attractions by public transport), noise (car or airport), and transport safety?

Next, we used the four general scenarios as the foundation stones for creating four site-specific scenarios for each of the three participating cities. To each individual scenario a package of e-services is assigned. These four city-specific packages of e-services will be presented and discussed in Section 6. To judge the four scenarios for each of the three participating cities, cities marketers gave scores to express the performance of the criteria for the reference situation as well as for the four scenarios and their e-service packages.

Finally, we have to apply a multi-criteria analysis (MCA) in which the set of weights of the criteria and the scores of the criteria for each scenario are used to evaluate the performance of each scenario.

The specific MCA technique deployed here is Regime analysis. This method is a so-called discrete MCA method which is suitable for evaluating multiple alternatives. The main advantage of the method is that it can cope with binary, ordinal, categorical and cardinal (ratio and interval scale) data. Regime analysis is also able to use mixed data sets. This applies to both the impacts and the weights used in the evaluation. Regime Analysis uses two kinds of input data: an impact matrix (structured information table) and a set of weights (Hinloopen et al. 1984, Nijkamp et al. 1990). The impact matrix consists of elements that measure the scores of the scenarios on the relevant criteria (e.g. criteria scores). The weights reflect the relative importance of each criterion according to the decision-maker. The main advantage of the Regime method is that it is able to judge qualitative and quantitative evaluation criteria, while it is able to generate an unambiguous ranking of choice possibilities or alternatives.

6 Formulation of City-specific Scenarios for Amsterdam, Genoa and Leipzig

6.1 Prefatory Remarks

All three cities in our analysis, viz. Amsterdam, Genoa and Leipzig, want to position themselves in the (inter)national tourist market by not only changing or enhancing their (entire) image, but also by popularizing the cultural heritage of the city and making cultural heritage more accessible. Less well-known cultural heritage should become available for visitors. However, the precise focus might be somewhat different (see also Table 3). Amsterdam has the most specific focus on international tourists and Leipzig the least; the latter also emphasizes the importance of cultural heritage for its own residents. The position of Genoa is somewhere in between with a strong national - Italian - focus. They all focus on specific themes, and their specific needs to fill gaps and wants of stakeholders, individual cities, city communities and cultural heritage sites by guiding visitors to understand their particular cultural heritage and the places and stories connected to it. But, there are some important differences in the city strategy of the three cities - Amsterdam, Genoa and Leipzig - as will be explained hereafter.

In terms of objectives, all three partner cities not only want to increase the number of visitors, but also to extend their 'tourist footprint', by making less well-known areas accessible. It is important to invite visitors and also residents to less well-known often hidden areas that are related to cultural heritage. All cities also realize that they need support of important stakeholders (private companies and, for instance, representatives of civic organizations) to make the implementation of e-services successful. It is of utmost importance to distinguish stakeholders and involve them into the process.

In all three cities the e-services are not only used to promote the cultural heritage of the city, but it is as important to direct the attention from the main tourist attractions of the city towards the less well-known – hidden – cultural heritage of the city. The cities want to extend the range of accessible cultural heritage facilities to reduce the pressure on main attractions and disperse the impact of tourist attention (and spending) over a larger area of the city. E-services are then expected to be one of the major tools to familiarize tourists with less well-known cultural heritage attractions already in advance of the actual visit of the city. All three city partners have considered the identification and use of appropriate e-services as an important contribution and support to be implemented for achieving their city's strategy and the related objectives.

Next, on the basis of the long list of criteria and considerations given in Table 2 the city-specific criteria were selected by city officials, based on average scores of importance for all criteria in Table 2. This led to the set of 8 city-specific final judgment criteria for each partner city concerned (see Table 3). It is surprising that these three cities exhibit so much variation; there are only a few criteria that are shared by all three cities.

Table 3. The Selected 8 Criteria by the Participating Cities

Type	**Criterion**	**Amsterdam**	**Genoa**	**Leipzig**
Functional requirements	Up-to-date information	X		
	Quality of information	X		X
	Pod/casts/downloads			X
	Access to booking facilities	X	X	
	Virtual maps	X	X	X
	Multilanguage		X	
	Personalisation		X	
User requirements	Function	X		X
	Ease of use	X	X	X
	Content	X		X
	Participation		X	
Societal impacts	Quality of life and sustainability			X
	Cultural profile	X	X	X
	Urban land use		X	

We will now briefly describe the specific details for each of the three cities involved, with a particular view on the scenarios developed in each city. For the Amsterdam case we will offer a more illustrative presentation of the various steps taken to compose the four city-specific scenarios. The same approach can be adopted for the two remaining cities.

6.2 Amsterdam

Below a brief description of the scenarios for Amsterdam is given. The scenarios are based on, first, either an active or inactive local government intervention regarding the design and implementation of e-services, and second, either minimal or maximal socio-economic opportunities to design and implement e-services (see Figure 2).

Scenario 1: The winner takes it all

In 2015, the economic recession has passed and the economy is in full swing again. The belief in the future has grown again; however, the past recession has made people aware of the importance of their roots. This awareness meant a boost in the interest for the cultural heritage not only from residents who want to experience and appreciate their cultural heritage, but also from other Dutch and international tourists. In short: national and international tourism is flourishing again and the city of Amsterdam is doing its utmost to attract a large share of this new business. The municipality of Amsterdam spends much money in restoring historical sites within the city and in making them accessible to a broad domestic and foreign public. Furthermore, the budget for promoting the city has increased. More attention is paid to attract additional visitors from Europe and let them experience by virtual means the beauties of Amsterdam already before visiting the city.

Scenario 2: Rowing upstream

In 2015, the economy is still recovering from the present economic recession. People - local residents, Dutch tourists and foreigners - are still reserved in their spending. As a consequence it is hard to develop the tourism sector. Nevertheless, the local government of Amsterdam still holds on their strategy to promote the city and still thinks the implementation of e-services might be an important tool to attract more visitors to Amsterdam. Given the slow economic recovery there is little room for public spending. However, the local government tries to make the best out of it. Given the limited financial resources, it has to set clear priorities in historical sites to be restored, while also the promotion budget is limited.

Scenario 3: Don't worry, be happy

In 2015, the economic recession has passed and the economy is in full swing (see scenario 1). The city of Amsterdam thinks that everything goes fine and is rather reluctant to invest in the further development of e-services. Although a considerable amount of money is spent on

restoring historical sites to satisfy its residents, the promotion budget has decreased. The municipality is less interested in (inter-)national tourists. They will come naturally by increasing the urban quality due to the increased quality of the cultural heritage of the city.

Scenario 4: Take it as it comes

In 2015, the economy is still recovering from the present economic recession (see scenario 2). The city of Amsterdam is not interested anymore in attracting additional visitors. It has a hard time facing the real problems of the city: increasing unemployment, decreasing population, increasing crime rates, etc. The budget available to restore historical sites is reduced to a level to be able to keep the cultural heritage in a steady state. There is no budget for real improvements nor the development and implementation of e-services.

After consultation of city experts the above mentioned scenarios comprising various types of e-services for the city of Amsterdam are evaluated using the Regime method (see Table 4). These findings can be interpreted in the following way. In Amsterdam scenario 1 always scores best and scenario 4 always worst, regardless the weights attached to the criteria. Of course, this is mainly due to the package of e-services offered in each scenario.

Table 4. Supply of e-services in the Four Scenarios for Amsterdam

Package scenario 1	**Package scenario 2**
• Multi-lingual virtual tours • Multi-lingual interactive maps • Multi-lingual online booking facilities • Multi-lingual journey planners • Multi-lingual personalised information • Multi-lingual e-forum/e-participation • Multi-lingual mobile devices • All contents downloadable/printable	• Virtual tours • Interactive maps • Online booking facilities • Journey planners • Personalised information • E-forum/e-participation • Mobile devices • All contents downloadable/printable
Package scenario 3	**Package scenario 4**
• Virtual tours • Interactive maps • Online booking facilities • Journey planners • Personalised information • All contents downloadable/printable	• Virtual tours • Interactive maps • Online booking facilities • Journey planners • Personalised information

The city of Amsterdam already offers many e-services. The main improvement would be to make them multi-lingual. This is the difference between scenarios 1 and 2. At present most

e-services are available in Dutch and English. There is a need for German, French and Spanish versions as well. Secondly, the only thing missing in the e-service package of scenario 4 compared with all other scenarios is downloadable/printable content. In the sensitivity analysis we were unable to move scenario 4 from the fourth rank by changing weights of the criteria. This is an indication that downloadable/printable content is also an important e-service. The difference between scenario 2 and scenario 3 concerns 'e-participation/e-forum' and 'mobile devices', which are included in scenario 2 and lacking in scenario 3. Nevertheless, scenario 3 performs nearly as well as scenario 3, and we were able to change rankings in the sensitivity analysis, by changing the weights of the criteria. Thus, e-participation/e-forum and mobile devices do not seem to be of significant importance. In conclusion, the city of Amsterdam should focus on the development of multi-lingual e-services and downloadable/printable content. E-participation/e-forum and mobile devices seem less important.

6.3 Genoa

In a similar way the packages of e-services for Genoa were developed are evaluated (see Table 5).

Table 5. Supply of e-services in the Four Scenarios for Genoa

Package scenario 1	**Package scenario 2**
• Multilingual municipality video channel (better structured than present one) • Multilingual e-services to get acquainted with the city • Multilingual educational e-tours • Multilingual interactive maps with information for all kind of activities • Multilingual online booking facilities (accommodation, attractions, on stage) • Multilingual e-forum/e-participation • Multilingual full virtual tours including POIs for the city and its surroundings (linked in the city portals) • Downloadable/printable contents (also on mobile devices)	• Municipality video channel (in Italian and English, better structured than present one) • E-service offering POIs* for all city districts (in Italian, linked in the city portals, however, without an virtual tour) • Interactive maps with information for all kind of activities • Online booking facilities (accommodation, attractions, on stage) • Downloadable/printable contents (also on mobile devices)

Package scenario 3	Package scenario 4
• Multilingual municipality video channel (better structured than present one) • Multilingual virtual tours including POIs* for all city districts (not linked in city portals) • Online booking facilities (accommodation, attractions, on stage)	• Municipality video channel (comparable to present one) • E-service offering POIs* for the Strada Nuova-Rolli palaces and the direct surrounding cultural heritage (without an virtual tour, poorly updated, not linked in city portal) • Online booking facilities (only accommodation)

POIs = points of interest

The main conclusion that arises from the Regime analysis is that it is better to focus on the development and implementation of a limited number of multilingual e-services, compared to offering a wide range of e-services available only in Italian. This conclusion is based on the fact that in the Regime analysis the e-service package of scenario 3 is able to outperform scenario 2. All stakeholders involved in this research further support this conclusion.

6.4 Leipzig

Leipzig is developing an active cultural tourism policy; its e-services packages for our scenario experiment are given in Table 6.

Table 6. Supply of e-services in the Four Scenarios for Leipzig

Package scenario 1	Package scenario 2
• Multi-lingual e-services to get acquainted with the city • Full virtual tours including POIs* for all city districts • Educational e-tours • Interactive maps with information for all kind of activities • Online booking facilities • e-Forum/e-participation	• e-service offering POIs* for all city districts (in German, without an virtual tour) • Interactive maps with information for all kind of activities • Online booking facilities
Package scenario 3	**Package scenario 4**
• Multi-lingual virtual tours including POIs* for all city districts • Online booking facilities	• E-service offering POIs* for Plagwitz and Waldstrassenviertel (without an virtual tour, poorly updated) • Online booking facilities

POIs = points of interest

In this case study it is difficult to make policy conclusions about the level of e-services to promote the cultural heritage in the city. In general, both city marketers gave the highest scores to all criteria in case of scenario 1 and lowered their scores for each criterion gradually towards scenario 4. In such a situation it is not possible to achieve a change in the ranking of the scenarios by changing the weights of the criteria. The development of interactive maps (scenario 2) seems to be more important than extending the e-service offering information about specific points of interest (POIs) for all city districts with a multi-lingual virtual tour (scenario 3). Only when the virtual map of scenario 3 is ignored and we give virtual maps the highest score, is scenario 3 able to outscore scenario 2.

7 Retrospect and Prospect

This paper has presented a general framework to evaluate the impact of the development of e-services in order to promote the cultural heritage in cities, in particular from the perspective of tourism. This framework is applicable for a variety of cities that want to evaluate their strategy by considering the development of e-services to promote cultural tourism as a strategic policy vehicle.

We conclude that a systematic definition and mapping of a rich diversity of perceptional and attitudinal elements that characterize the (current or future) profile of a city for visitors is possible. In our strategic assessment exercise the potential of e-services in the tourist sector was highlighted, taking into account the fact that there is a wide spectrum of e-services that may favour the tourist sector in a city with an attractive cultural heritage profile. The use of local expertise is critical for a systematic analysis of future options. Likewise, it is also of critical importance to exploit local knowledge in developing and generating policy priorities regarding the specific criteria that govern the city's interest in tourism strategies from the perspective of sustainable cultural heritage. This analysis framework has next been tested by means of case study research for three cities, viz. Amsterdam, Genoa and Leipzig.

In our application of the above framework for the cities of Amsterdam, Genoa and Leipzig, we have developed strategic policy scenarios and have next applied Regime analysis to evaluate the impact of those policy scenarios. This turned out to be a very promising operational approach, with a full participation of urban stakeholders.

The evaluation methods deployed here have a general scope and can also be applied for other types of evaluation purposes. We have developed here strategic policy scenarios for tourist e-services, but one can also compare different combinations of e-services to find out which set of e-services has the most favourable impact. For instance, if one wants to develop two e-services and has three options (for example, interactive maps, virtual tours and online booking facilities), multi-criteria analysis can be applied to select the optimal combination: either interactive maps and virtual tour, or interactive maps and online booking facilities, or virtual tour and online booking facilities. Also for such policy questions relevant criteria can

be identified and weighted by decision makers in the city.

Our methodology thus offers a general architecture – or conceptual framework – for a policy-oriented strategic choice in urban cultural heritage policy in relation to tourism. It allows the incorporation of single e-services or packages of e-services in the tourist sector, and will be of great importance as a decision-making aid tool for urban tourist policy.

References

Alegre, J.A., and L. Pou (2004), Micro-economic Determinants of the Probability of Tourism Consumption, *Tourism Economics*, 10, pp. 125-144.

Amelung, B. (2006), *Global (Environmental) Change and Tourism*, Ph.D. Thesis, University of Maastricht.

Bakos, Y. (1998), The Emerging Role of Electronic Marketplaces on the Internet, *Communications of the ACM*, 41, 35-42.

Bruinsma, F.R., Nijkamp, P., Vreeker, R., Kourtit, K., Koppig, T., Wolf, E. and Dallorso, P. (2009), *Supporting decision making in the cultural sector*. Deliverable 3.4, ISAAC, EU, Brussels.

Chen, P.Y., and L.M. Hitt (2002), Price Dispersion Differentiation in Online Travel: an Empirical Investigation, *Management Science*, 48, 534-549.

Coccossis, H. and Nijkamp, P. (Eds.) (1995), *Sustainable Tourism Development*, Avebury, Aldershot, UK.

Cooper, C., and A. Lockwood (eds.) (1994), *Progress in Tourism, Recreation and Hospitality Management*, Belhaven, London.

Cooper, C., J. Fletch, D. Gilbert, A. Fyall and S. Wanhill (2008), *Tourism: Principles and Practice*, Prentice-Hall, Englwood Cliffs.

Crouch, G.I. (1994), The Study of Tourism Demand: A Review of Findings, *Journal of Travel Research*, 33, 12-23.

Buhalis, D, and Deimezi, O. (2004), E-tourism Developments in Greece: Information Communication Technologies Adoption for The Strategic Management of the Greek Tourism Industry, *Tourism and Hospitality Research Journal*, 5, 103-130.

Eilat, Y., and L. Einav (2004), Determinants of International Tourism: a Three-dimensional Panel Data Analysis, *Applied Economics*, 36, 1315-1327.

Eugenio-Martin, J.L. (2003), Modelling the Determinants of Tourism Demand as a Five-stage Process: A Discrete Choice Methodological Approach, *Tourism and Hospitality Research*, 4, 341-354.

Eymann, A., and G. Ronning (1997), Microeconometric Models of Tourists' Destination Choice, *Regional Science and Urban Economics*, 26, 735-761.

Fusco Girard, L., and P. Nijkamp (eds.) (2009), *Cultural Tourism and Sustainable Local Development*, Ashgate, Aldershot, UK.

Giaoutzi, M., and P. Nijkamp (eds.) (2006), *Tourism and Regional Development: New Pathways*, Ashgate, Aldershot, UK.

Hinloopen, E., P. Nijkamp and P. Rietveld (1984), The Regime Method; a New Multicriteria Method, *Essays and Surveys on Multiple Criteria Decision Making (* P. Hansen, ed.), Berlin, Springer**,** 146-155.

Lindberg, K., T.D. Andersson and B. Dellaert (2001), *Tourism Development, Annals of Tourism Research*, 28, 1010–1030.

Massey, A.P, Khatri, V. and M.M. Montoya-Weiss (2007), Usability of Online Services: The Role of Technology Readiness and Context, *Decision Sciences*, 38, 277-308.

Matias, A., P. Nijkamp and P. Neto (eds.) (2008), *Advances in Modern Tourism Research*, Physika-Verlag, Heidelberg.

Nijkamp, P. (1995), Quantity and Quality in Evaluation Indicators for Our Cultural-Architectural Heritage, Planning for Our Cultural Heritage (H. Coccossis and P. Nijkamp, eds.), Avebury, Aldershot, 17-37.

Nijkamp, P., P. Rietveld and H. Voogd (1990), *Multicriteria Analysis for Physical Planning*, Amsterdam, Elsevier.

Prosser, R. (1994), Societal Change and the Growth in Alternative Tourism, *Ecotourism: A Sustainable Option?* (E.Cater and G. Lowman, eds.), John Wiley, Chichester, 91-114.

Rabinovich, E., and J.P. Bailey (2004), Physical Distribution Service Quality in Internet Retailing: Services pricing, Transaction Attributes, and Firm attributes, *Journal of Operations Management*, 21, 651-672.

Raventos, R. (2006), The Internet Strategy of the Costa Rican Tourism Board, *Journal of Business Research*, 59, 375-386.

Sharpley, R. (2000), Tourism and Sustainable Development, *Journal of Sustainable Tourism*, 8, 1-19.

Smeral, E., and A. Weber (2002), Forecasting International Tourism Trends to 2010, *Annals of Tourism Research*, 27, 982-1006.

Smith, M.D., and R.S. Krannich (1998), Tourism Dependence and Residents Attitudes, *Annals of Tourism Research*, 25, 783-802.

Swarbrooke, J. (2002), *Sustainable Tourism Management*, CABI Publishing, New York.

UNCTAD (2005), E-Commerce and Development 2005, Report by the UNCTAD secretariat, UNCTAD/SDTE/ECB/2005/1, UNCTAD Science Technology and ICT Branch, Geneva.

UN WTO (2006), World Tourism Barometer, *World Tourism Organization*, Madrid, 4.

Urry, J. (2002), *The Tourist Gaze*, Sage, London

Wirtz, J. (2001), Improving the Measurement of Customer Satisfaction: A Test of Three Methods to Reduce Halo, *Managing Service Quality*, 11, 99-111.